clients;

a mixing section enabling the audio conference server to provide spatialized audio to said plurality of audio clients in said at least one audio conference,

wherein said mixing section includes a distance-based attenuation section providing distance-based attenuation according to sound decay characteristics, at least one sound decay characteristic being assigned to each audio client from a plurality of sound decay characteristics, and

wherein said mixing section results in mixed audio data; and

a delivery section enabling delivery of said mixed audio data to said plurality of audio clients in said at least one audio conference.--

REMARKS

The application has been reviewed in light of the Office Action dated April 6, 2001. Claims 1, 3-9, 11-18, 20-25 and 45-48 are pending in this application, with claims 1, 7, 9, 17, 18, 24 and 45-48 being in independent form. By the present Amendment, claims 1, 9, 18 and 45-47 have been amended. It is submitted that no new matter has been added and no new issues have been raised by the present Amendment.

Claim 46 has been amended hereby in order correct formalities and to place the application in better condition for allowance. The amendments made to claim 46 are in no way intended to limit the scope of claim 46.

Claims 1, 3-5, 7, 9, 11, 12, 13, 18, 20, 21, 24, 45, 47 and 48 were rejected under 35 U.S.C. 103(a) as allegedly unpatentable over U.S. Patent 5,710,591 to Bruno et al. in view of Cohen et al., IEEE 1993, "Virtual gain for audio windows". Claims 6, 14-16 and 23 were

rejected under Section 103(a) as allegedly unpatentable over Bruno et al. in view of Cohen et al. and further in view of U.S. Patent 5,764,750 to Chau et al. Claims 8, 17, 25 and 46 were rejected under Section 103(a) as allegedly unpatentable over Bruno et al. in view of Cohen et al. and further in view of U.S. Patent 5,864,816 to Everett. Applicant has carefully considered the Examiner's comments and the cited art, and respectfully submits that independent claims 1, 7, 9, 17, 18, 24, and 45-48 are patentable over the cited art for at least the following reasons.

Independent claim 1 of the present application relates to an audio conference server for enabling an application program to provide multi-point, weight-controllable audio conferencing. The audio conference server comprises means for managing at least one audio conference, the at least one audio conference comprising a plurality of audio clients, means for receiving audio data from said plurality of audio clients and means for mixing said audio data to provide spatialized audio data to the plurality of audio clients. The mixing means includes means for providing distance-based attenuation according to sound decay characteristics, at least one sound decay characteristic being assigned to each audio client from a plurality of sound decay characteristics and the mixing means results in mixed audio data. The audio conference server also provides means for delivering the mixed audio data to the plurality of audio clients

Bruno et al, as understood by Applicant, relates to a method and apparatus for recording and indexing audio information exchanged during an audio conference call or video, audio and data information exchanged during a multimedia conference. Voice activated switching functionality of a multipoint control unit provides a video signal, which is input into the multipoint control unit from a workstation from which an audio signal is detected, to each of the other workstations in the conference. A workstation or participant-identification signal

is generated by the multipoint control unit and stored with the audio signal and video information.

Cohen et al., as understood by Applicant, relates to audio windowing at a frontend, or user interface, to an audio system with a spatial sound backend. Gain adjustment is "used to control the volume of the various sources." (Abstract, page 85) A virtual gain "can be synthesized from components derived from iconic size, distance, orientation and directivity and selectively enabled according to room-wise positioning of sources across sinks." (Abstract, page 85) As understood by Applicant, virtual gain can be composed into four dimensionless components including distance effects ($gain_{distance}$). (Cohen et al., p 86) The distance-dependent gain ($gain_{distance}$) can capture the effects of distance between source and sink and is defined by a set formula. (Cohen et al., page 87-88) That is, in Cohen et al., the distance-dependent gain ($gain_{distance}$) is a single value at any given distance from a source. (See p. 87-88 and Figure 3)

Regarding claim 1, the Examiner contends that Cohen et al. discloses a mixing means for providing distance-based attenuation according to sound decay characteristics with specific reference to Section 1.2 and Figure 3 of Cohen et al. Further, in response to the arguments included in Applicant's response dated January 2, 2001, the Examiner contends that the distance-dependent gain parameter used in Cohen et al. discloses a mixing means for providing distance-based attenuation according to sound decay characteristics with specific reference to Section 1.2 and Figure 3.

Section 1.2 of Cohen et al., as understood by Applicant, describes distance dependent gain ,$gain_{distance}$, used as one component of a virtual gain. As can be seen in Equation (2) on page 87 of Cohen et al., the distance determined gain at any given distance, $gain_{distance}$ (distance), is defined by a single equation or characteristic. Figure 3 apparently illustrates an

evaluation of this function at various distances. (See caption of Figure 3)

Cohen et al., however, is not understood by Applicant to teach or suggest providing distance-based attenuation according to sound decay characteristics, at least one sound decay characteristic being assigned to each audio client from a plurality of sound decay characteristics.

Accordingly, Applicant respectfully submits independent claim 1 is patentable over the cited art.

Independent claims 9, 18, 45 and 47 are believed to be patentable over the cited art for at least similar reasons.

Further, additional distinctions are found in independent claim 7 of the present application which discloses an audio conference server for enabling an application program to provide multi-point, weight controllable audio conferencing. The audio conferencing system comprises means for managing at least one audio conference, the one audio conference comprising a plurality of audio clients, means for receiving audio data from said plurality of audio clients and means for mixing said audio data to provide spatialized audio data to the plurality of audio clients. The mixing means includes means for providing distance-based attenuation according to sound decay characteristics and the mixing means results in mixed audio data. The audio conference server also provides means for delivering said mixed audio data to said plurality of audio clients. The means for providing distance-based attenuation according to sound decay characteristics comprises means for identifying a decay factor from one of a plurality of pre-defined decay factors and a customized decay factor for each of said plurality of audio clients. The plurality of predefined decay factors includes an audio big decay factor, and audio small decay factor, an audio medium decay factor and a constant decay factor. The means for providing distance-based attenuation according to sound decay characteristics also comprises means for determining distances between a target audio client

and a plurality of source audio clients, means for determining a plurality of weighted values for each of said source audio clients based on said identified decay factor and said distance between each of said source audio clients and said target audio client, wherein each of said weighted values corresponds to a source/target audio client pair, means for generating a mix table for each of said source/target audio client pairs, means for calculating an actual mix for said audio target clients and means for refining said actual mix for said target audio clients.

Regarding claim 7, the Examiner contends that Cohen et al. discloses "a continued gradual decay characteristics" and therefore inherently discloses an audio big decay factor, audio small decay factor, an audio medium decay factor and a constant decay factor. Further, in response to the arguments set forth in Applicant's response dated January 2, 2001, the Examiner suggests that Cohen et al. discloses "some continued gradual decay characteristics" with specific reference to Figure 3 and argues that an audio big decay factor, an audio small decay factor, an audio medium decay factor and a constant decay factor are inherently disclosed. Applicant respectfully disagrees.

As understood by Applicant, Figure 3 of Cohen et al. is an evaluation of distance-dependent gain ($gain_{distance}$) at various distances from a source. Specifically, Figure 3 illustrates the desired behavior "to drop from loudest when the objects are touching each other to quiet across the room." (Cohen et al., Page 87-88). The distance dependent gain, $gain_{distance}$, between source and sink is determined based on the same equation or characteristic for all sources and clients. Virtual gain is composed of size dependent and position dependent dimensionless components. (Cohen et al., page 87) Individual components, however, are not identified for each of a plurality of conference participants. The same dimensionless components of the virtual gain are applied to all conference participants in Cohen et al.

Cohen et al., is not understood by Applicant to teach or suggest identifying a decay

factor from one of a plurality of pre-defined decay factors and a customized decay factor for each of the plurality of audio clients.

Figure 3 of Cohen et al. merely illustrates an evaluation of the $gain_{distance}$, a single decay characteristic. As can be seen in Figure 3, the value of the $gain_{distance}$ is relatively high at small distance values and decreases as distance values increase. With reference to Figure 3, it is clear that at any given distance, $gain_{distance}$ has a single value. In other words, the distance dependent gain in Cohen et al. is the same for all audio clients at a specific distance from a source.

Cohen et al. is not understood by Applicant to teach or suggest that the plurality of pre-defined decay factors includes an audio big decay factor, an audio small decay factor, an audio medium decay factor, and a constant decay factor.

Accordingly, Applicant respectfully submits that claim 7 is patentable over the cited art for at least the above-mentioned reasons.

It is respectfully submitted that claims 17, 24, 46 and 48 are patentable over the prior art for at least similar reasons.

Independent claims 17 and 46 are believed to be patentable over the combination of Bruno et al. and Cohen et al. for at least similar reasons. Further, Everett is not believed to provide any of the elements missing from Bruno et al. and Cohen et al. that would have made claims 17 and 46 obvious to a person of ordinary skill in the art.

Accordingly, Applicant respectfully submits that claims 17 and 46 are patentable over the cited art for at least the above-mentioned reasons.

The Office is hereby authorized to charge any additional fees which may be required in connection with this amendment and to credit any overpayment to our Deposit Account No. 03-3125.

If a petition for an extension of time is required to make this response timely, this paper should be considered to be such a petition, and the Commissioner is authorized to charge the requisite fees to our Deposit Account No. 03-3125.

If a telephone interview could advance the prosecution of this application, the Examiner is respectfully requested to call the undersigned attorney.

Entry of this amendment and allowance of this application are respectfully requested.

Respectfully submitted,

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MARKED COPY OF CLAIMS

--1. (Amended Twice) An audio conference server (ACS) for enabling an application program to provide multi-point, weight controllable audio, the ACS comprising:

means for managing at least one audio conference, said at least one audio conference including a plurality of audio clients;

means for receiving audio data from said plurality of audio clients;

means for mixing said audio data to provide spatialized audio to said plurality of audio clients in said at least one audio conference,

wherein said mixing means includes means for providing distance-based attenuation according to sound decay characteristics, at least one sound decay characteristic being assigned to each audio client from a plurality of sound decay characteristics, and

wherein said mixing means results in mixed audio data; and

means for delivering said mixed audio data to said plurality of audio clients in said at least one audio conference.--

--9. (Amended Three Times) A method for enabling an audio conference server ACS to provide an application program with multi-point, weight controllable audio conferencing, comprising:

(1) managing at least one audio conference, said at least one audio conference comprising a plurality of audio clients;

(2) receiving audio data from said plurality of audio clients;

(3) mixing said audio data to provide spatialized audio to said plurality of audio clients in said at least one audio conference,

wherein said mixing includes providing distance-based attenuation according to sound decay characteristics, at least one sound decay characteristic being assigned to each audio client from a plurality of sound decay characteristics, and

wherein said mixing results in mixed audio data; and

(4) delivering said mixed audio data to said plurality of audio clients in said at least one audio conference.--

--18. (Amended Three Times) A computer program product comprising a computer useable medium having computer program logic recorded thereon for enabling an audio conference server (ACS) to provide an application program with multi-point, weight controllable audio conferencing, said computer program logic comprising:

means for enabling the computer to manage at least one audio conference, said at least one audio conference including a plurality of audio clients;

means for enabling the computer to receive audio data from said plurality of audio clients;

means for enabling the computer to mix said audio data to provide spatialized audio to said plurality of audio clients in said at least one audio conference,

wherein said mixing means includes means for enabling the computer to provide distance-based attenuation according to sound decay characteristics, at least one sound decay characteristic being assigned to each audio client from a plurality of sound decay characteristics, and

wherein said mixing means results in mixed audio data, and

means for enabling the computer to deliver said mixed audio data to said plurality of audio clients in said at least one audio conference.--

--45. (Amended) An audio conference server providing multi-point, weight controllable audio conferencing comprising:

a management device managing at least one audio conference, said at least one audio conference including a plurality of audio clients;

a receiver receiving audio data from said plurality of audio clients;

a mixer mixing said audio data from said plurality of audio clients;

wherein said mixer includes a distance-based attenuation device providing distance-based attenuation according to sound decay characteristics, at least one sound decay characteristic being assigned to each audio client from a plurality of sound decay characteristics, and

wherein said mixer provides mixed audio data; and

an audio data delivery device delivering said mixed audio data to said plurality of audio clients in said at least one audio conference.--

--46. (Amended) An audio conference server providing multi-point, weight controllable

audio conferencing comprising:

a management device managing at least one audio conference, said at least one audio conference including a plurality of audio clients;

a receiver receiving audio data from said plurality of audio clients;

a mixer mixing said audio data from said plurality of audio clients;

wherein said mixer includes a distance-based attenuation device providing distance-based attenuation according to sound decay characteristics, and

wherein said mixer provides mixed audio data,

wherein said distance-based attenuation device includes:

an identification device identifying a decay factor from one of a plurality of pre-defined decay factors and a customized decay factor for each of said plurality of audio clients, said plurality of pre-defined decay factors including:

an audio big decay factor,

an audio small decay factor,

an audio medium decay factor, and

a constant decay factor,

a distance determining device determining a distance between a target audio client and a plurality of source audio clients,

a weighted value determining device determining a plurality of weighted values for each of said source audio clients based on said identified decay factor and said distance between each of said source audio clients and said target audio client, wherein each of said weighted values corresponds to a source/target audio client pair,

a mix table generator generating a mix table for each of said source/target audio client pairs,

a calculator calculating an actual mix for said target audio clients, and

a refining device refining the actual mix for said target audio clients; and

an audio data delivery device delivering said mix audio data to said plurality of audio clients in said at least one audio conference.--

--47. (Amended) A computer executable code for an audio conference server providing multi-point, weight controllable audio conferencing, said code comprising:

a managing section enabling management of at least one audio conference, with said at least one audio conference including a plurality of audio clients;

a receiving section enabling reception of audio data from said plurality of audio clients;

a mixing section enabling the audio conference server to provide spatialized audio to said plurality of audio clients in said at least one audio conference,

wherein said mixing section includes a distance-based attenuation section providing distance-based attenuation according to sound decay characteristics, at least one sound decay characteristic being assigned to each audio client from a plurality of sound decay characteristics, and

wherein said mixing section results in mixed audio data; and

a delivery section enabling delivery of said mixed audio data to said plurality of audio clients in said at least one audio conference.--